Response to Comments for the Draft Smallmouth Bass Spring Sampling WP-QAPP for the River OU
Comments received February 18, 2022; USACE response to comments on March 4, 2022
Bradford Island Cascade Locks, Oregon

Number	Comment	USACE Response
U.S. EPA		
1.	EPA reviewers agree that additional tagging data could be helpful, and it will certainly be interesting to see how spill operations effect fish behavior in the forebay. We are pleased to see the extended area of acoustic receivers proposed. However, we do not agree that additional bass tissue data is needed at this time. We don't believe that understanding seasonal variability in bass tissue concentrations is imperative because it is unlikely to change the outcome of the risk assessments or the Feasibility Study – regardless of seasonal changes, cleanup actions in the river are needed to lower contaminant concentrations (especially PCBs) in fish. We are also concerned that the data generated will not be sufficient to meet the stated objective of understanding seasonal variability and that it may be difficult to draw conclusions from the results. We do not see a need to update the risk assessments. EPA would prefer to focus near term OU1 efforts on screening remedial technologies and collecting data needed to design and implement remedial actions.	USACE believes fish tissue consumption is a notable risk exposure pathway that warrants additional characterization. However, prior to the current effort, there had been more than ten years since the previous tissue sampling event in 2008/2011. The results from the Fall tissue sampling help to understand the CSM and communicate risk. However, the subpopulation of smallmouth bass, and the associated tissue concentrations may differ in the spring due to differences in fish movement and water flow through the forebay. Sampling at this time will be used to support refinement of the CSM, provide a more robust dataset for comparison with historical data, communicate current conditions at the Site and inform future sampling efforts and baseline development. Analyzing fish tissue samples during a spring collection effort will provide a strong representation of the concentration range and potential variability present in bass. This collection effort will also serve as a valuable data point for future monitoring efforts. In regard to meeting the stated objectives for the study, USACE suggests reviewing the statistical analysis provided with the previous sampling effort (QAPP, August 2020) for the supporting power analysis, which identifies the detectable differences achievable with the target sample size. An additional power analysis is provided as an appendix to this current QAPP to address the specific objectives of the seasonal sampling and incorporates the variability seen in the fall 2020 sampling. USACE plans to continue working concurrently on the Upland OU while also conducting work associated with the River OU.
2.	**Page 13, Table 3**. Since a lab has not been identified, it would be helpful to at least know what lab accreditation USACE requires.	The applicable laboratory accreditation program for DoD projects is the DoD Environmental Laboratory Accreditation Program (ELAP). It is a unified DoD program through which laboratories demonstrate competency and document conformance to the international standard ISO/IEC 17025:2005, General Requirements for the Competence of Testing and Calibration Laboratories as implemented by the DoD Quality Systems Manual for Environmental Laboratories (DoD QSM). The contract laboratory holds DoD ELAP accreditation for all methods being performed as part of this sampling effort for solids. The accreditation certificate is provided as an appendix.
3.	**Pages 13 and 14, Section 1.2.2 Problem Definition, Site History, and Background**. The discussion of 2017/2018 sampling of the supplemental passive porewater and sediment traps did not include an analysis of the contaminant data in the porewater or sediments that was derived from those efforts and only noted the presence of cobbles and boulders from a video survey of the river bottom. In addition, the decision to collect additional fish data to answer the question of seasonal influences was not referenced against a specific analysis of the existing data set that identifies this type of data gap. Supplemental data gathering efforts should be supported by a data gap/data uncertainty analysis.	Data analysis for porewater is still in process given ongoing negotiations related to analysis methods with external technical reviewers. Chemistry results associated with sediment traps was not possible given recovery limitations. Seasonal variability for several parameters, including overall body mass, relative liver mass, lipid content, and the reproductive life cycle is a documented occurrence for smallmouth bass in the Columbia River (Rose, et.al., 2013). Smallmouth bass are semi-dormant during the winter when water temperatures are low. As temperatures increase during the spring, feeding and migration increase. These factors could reasonably be anticipated to influence chemical body burden in smallmouth bass near Bonneville Dam. This study aims to confirm if these physiological variations have a notable influence on body burden. In addition, site-specific flow in the forebay may influence fish movement from the presumptive source area and the distribution of fish with elevated tissue levels. This information has been added to Section 1.2.2 of the QAPP.
4.	**Page 14, Section 1.2.2., second full paragraph**. The language "Based on the length of time since previous fish sampling" is confusing, because fish were sampled recently, in 2020. Similar language appears in the second paragraph of Section 1.3.1.	The language in these sections has been revised.
5.	**Page 14, Section 1.2.2, second full paragraph.** Near the end of this section, the text cites seasonal variability as the reason for conducting the study. It would be helpful to provide additional detail here. What are the important	Seasonal variability for several parameters, including overall body mass, relative liver mass, lipid content, and the reproductive life cycle is a documented occurrence for smallmouth bass in the Columbia River (Rose,

	seasonal changes that could impact the results? The study will collect additional bass, but not additional crayfish or clams. This suggests that USACE believes any seasonal differences will be related primarily to changes in bass behavior or physiology, not to seasonal differences in contaminant flux or discharge from upland sources. What about bass is different in March? Feeding rate? Spawning status? Why is March the best time to collect additional tissue for analysis?	et.al., 2013). Smallmouth bass are semi-dormant during the winter when water temperatures are low. As temperatures increase during the spring, feeding and migration increase. These factors could reasonably be anticipated to influence chemical body burden in smallmouth bass near Bonneville Dam. Another potential influence to seasonal variations could be due to changes in flow patterns, potentially introducing different populations of fish not present during fall sampling. The goal of this study is not to decern which factors influence contaminant body burden, but rather to determine if spring conditions influence contaminant body burden of the spring subpopulation. This information has been added to Section 1.2.2 of the QAPP. The March/April timeframe is targeted for collection to contrast the collection effort in fall 2020 and the corresponding physiological changes in smallmouth bass during those seasons. Bass are a notable risk exposure pathway that warrants additional characterization and increased sample numbers. USACE collected a large number of clams and crayfish in 2020 and believe sufficient data is available for those biota. Clams were collected in two separate phases, with concentrated sampling along the northern shoreline of Bradford Island as well as other locations around Bonneville Dam and upstream, providing a robust dataset for analysis.
6.	**Page 16, Table 4**. The line "PQOs Developed for Summer 2020 Sampling (USACE, 2020)" at the top of this table is confusing. Some of the language appears to be taken word for word from the 2020 sampling plan, but in other places, the language has been updated for 2022.	The table has been revised and clarifying text has been added.
7.	**Page 16 and 17, Table 4, PQOs 2 and 4**. Assessing seasonal differences is cited as the reason for the study. But it may be difficult to draw clear conclusions. If concentrations are lower in 2022 than they were in 2020, will that suggest a continued decline in concentrations? Or will it suggest seasonal differences, perhaps due to lower feeding rates in winter? If concentrations are higher, will that suggest the decline cited by USACE in the October 2021 data report was illusory? Or would seasonal differences, perhaps due to female fish gaining fat through egg production explain the increase?	If concentrations decrease between fall of 2020 and spring of 2022, USACE would not draw a conclusion that the decrease is due to continued declines in concentration over time. The fall 2020 data indicated that PCB concentrations in fish were notably lower than those sampled in 2008/2011. The fall 2020 and spring 2022 fish would likely be used together when understanding changes since 2008/2011 if the spring population is determined to not be statistically different from the fall sampling. Should seasonal differences be detected between the fall 2020 and spring 2022 bass, the most likely reason for this could be due to seasonal variability in overall body mass, relative liver mass, lipid content, the reproductive life cycle, and fish movement. Understanding these differences would help to determine the best time to sample during future monitoring, as well as understanding whether there is a different contaminant profile with the potentially different subpopulation.
8.	**Page 19, Table 6**. Bait will be analyzed, but there is no plan to use the resulting data. We don't object to analyzing the bait, but since the fish stomach contents will be removed via gastric lavage prior to analysis (as described in Section 2.1.2), it is not clear why analyzing the bait is important.	Application of the analytical results for bait will be most relevant if retained stomach content is analyzed at a later date. This clarification has been added to Section 2.1.2
9.	**Page 21, Section 2.1.1.** The results of the previous fish tagging study suggest that at least portions of the "reference target area" described here and shown on Figure 3 are problematic. Fish that were caught, tagged, and released on the north shore of Bradford Island traveled to locations in the "reference target area." Table 3 of the report (Kock et. al 2021) shows that fish from North Bradford Island traveled to Boat Rock, Goose Island, Cascades Island, and the North Shore. This suggests that a different reference area, well upstream of RM 147, is needed to ensure fish from reference areas have not been exposed to contaminants released from Bradford Island.	The location of the reference area within the forebay of Bonneville Dam was determined based on extensive coordination and feedback from external technical reviewers, including Yakama Nation, Oregon DEQ, and US Fish and Wildlife Service during development of the sampling plan to support fall of 2020 collection efforts. In order to eliminate introduction of additional confounding factors by introducing a new reference location for this round of sampling, USACE is electing to retain the same reference location at this time. This reference location helps to concentrate resources and collection efforts in the area of interest. It was acknowledged prior to fall 2020 sampling that any background reference area will have issues with outlier concentrations, and that statistical analysis could be used to address this concern. Based on the data collected in fall 2020, there does appear to be a subset of bass that potentially represent a background or ambient concentration for PCBs, with a break in concentrations that may be indicative of source contamination. Further statistical analysis of the data will help to confirm and refine this statement.

		In order to meet the objectives of the study for assessing potential seasonal variability, moving of the Reference area for this round of sampling is not preferred as it would introduce a potential confounding variable into the dataset.
10.	**Page 22, Section 2.1.2 Sample Collection Procedures**. The portion of the fish tissue used for analysis needs to be identified (i.e., whole body, edible fillet w/belly fat, scales or no scales, etc.). From the previous studies this appears to be whole-body, though these details need to be identified in the QAPP in order to fully establish the representativeness of the resulting contaminant data.	Correct that the processing method is the same as from the Fall 2020 bass tissue sampling effort. The whole body of each fish (excluding stomach contents) will be processed three times through a meat grinder prior to analysis. This detail has been added to the QAPP.
11.	**Page 28, Section 2.3.2 Analytical Method QC Samples**. Because the lab is yet to be selected, USACE will need to update the LCS and Surrogate control limits used by the lab once those become available. In lieu of updating this section, this could be provided in the Stage 2 data validation reports, but this needs to be documented to support data comparability, usability, and any future evaluation of the data.	This information will be included with the laboratory reports and the data validation reports.
12.	**Page 30, Section 4.3.1**. Data validation is planned to Stage 2a only. EPA's preference would be to validate to State 4 ten percent of the analytical data.	Agree. The text has been updated to indicate ten percent of analytical data will be validated to Stage 4.
13.	**Pages 36 and 37, Section 5.4**. What are the project-specific goals for data precision, accuracy, and completion? How will representativeness be determined, given that no trip blanks or equipment rinse blanks are planned?	1) Precision will be evaluated for duplicate pairs such as MS/MSD, etc., as the relative percent difference (RPD), and please see Section 5.4.1 for the definition of RPD. Analytical RPD will be evaluated against the laboratory method limits, and that information will be included in the laboratory reports and data validation reports. 2) Accuracy will be evaluated as percent recovery for samples such as MS, MSD, LCS, LCSD, and surrogates; see section 5.4.2. Analytical percent recovery will be evaluated against the laboratory method limits, and that information will be included in the laboratory reports and data validation reports. 3) The analytical completeness goal for this sampling event is 95%. This has been added to Section 5.4.4. 4) Representativeness will be addressed by evaluating blank samples for the analytical methods, sample custody, and holding times and temperatures; please see section 5.4.3. Trip blanks are not applicable as there is not volatiles analysis. Equipment rinse blanks are not applicable as whole organisms will be submitted to the laboratory, so there is no dissection equipment utilized. Bass will be collected by angling (fishing), and contamination from hook and line is not expected as the hook and line will be in the river prior to contact with the bass. Representative samples of bait will be analyzed, and stomach lavage will be performed to empty the bass stomach contents.
14.	Appendix A **PDF page 2, Background**. It appears this section has not been updated – the last sentence suggests the 2020 study has not yet been implemented.	The text in this section has been updated.
15.	Appendix A **PDF page 3, last paragraph, Implementation Methods**. The removal of stomach contents is not described here. It should be, unless it will be performed at the laboratory (which seems unlikely, as the fish will be dead and frozen when they arrive at the lab). Were stomach contents removed prior to analysis during the 2020 study? Please confirm; if this is a change from the previous study, EPA recommends NOT removing stomach contents this time, as doing so would introduce a new and potentially confounding variable.	Stomach contents were removed for the Fall 2020 study using gastric lavage and the same methods will be performed for this study. This information has been added to the Implementation Methods in Appendix A.
16.	Appendix A **PDF Page 5, second paragraph, Acoustic Telemetry Study**. The text doesn't describe how the receivers will be deployed or how staff will visit the sites during the study to check on the operational status and download data. We assume this work will be done by boat. However, many of the sites appear to be within the forebay Boating Restriction Zone. Will the receivers in this area be accessible from land? Or will they simply not be checked until after spill operations have ended in September or early October?	Text in Appendix A was updated to indicate receivers will be deployed and checked by USGS staff by both boat and via land access where feasible. Receivers within the BRZ will be accessible by land and checked at regular intervals.
17.	Appendix A	Reference to the 2020 study was added to the text and in the reference section.

	PDF page 6, examples of previous telemetry research. The 2020 study should be at least mentioned and include in the list of links - https://pubs.er.usgs.gov/publication/ofr20211099	
18.	Appendix A **Laboratory Methods**. The QAPP does not include information about how the tissue will be handled and processed by the laboratory. This could be important, especially as these fish will go to a different laboratory than those collected in 2020. Please ensure that the equipment and procedures used grind up the fish, weigh out and digest the samples, etc. are documented in the final report if these details are not available prior to the sampling event.	The whole fish will be homogenized before analysis (please see section 2.1.2), and this information will be included in the laboratory reports.
19.	Appendix B Please add Water Temperature to the form and collect subsurface water temperature at least once a day when staff are in the field for this study. Water temperature can impact fish behavior, so understanding any significant temperature changes could be helpful in evaluating the study results.	Text has been updated in Section 1.4 of the QAPP stating that daily water temperature from the Bonneville Dam Forebay will be obtained from the Columbia Basin Research DART River Environment Daily Data (http://www.cbr.washington.edu/dart/query/river_daily). Due to the timing of the sampling (March/April), water temperatures are expected to be homothermic throughout the water column.
20.	Reference Kock, T.J., Hansen, G.S., and Evans, S.D., 2021, Behavior and movement of smallmouth bass (*Micropterus dolomieu*) in the forebay of Bonneville Dam, Columbia River, August–December 2020: U.S. Geological Survey Open-File Report 2021–1099, 13 p., https://doi.org/ 10.3133/ ofr20211099.	Reference added.
Yakama Nation		
1.	This is a significant use of time, effort and resources, yet the rationale and Data Quality Objectives(DQOs) for doing this second round of bass tissue sampling and tracking are very unclear. Why is it important to understand seasonal variability in fish tissue contaminant concentrations? What decisions or recommendations would come from higher or lower spring bass tissue data? How will this information help inform cleanup decisions? Why is this round 2 study limited to bass, the most mobile of sampled species/media? What data gaps or uncertainties is this study proposing to address? Is this spring study alone sufficient to develop reliable and robust statistics to evaluate the goals (ex. evaluating seasonal variability), or will it create more questions? Are there follow-up sampling events planned to provide a statistically reliable dataset? The bass tracking may provide interesting information, but it is also unclear how this information would be used in decision-making. What are any other intended uses for the tissue and telemetry data? Before going down this path, we recommend confirming whether or not these are high priority data needs and goals that will help fill in the site conceptual model in a way that informs cleanup decisions.	USACE believes fish tissue consumption is a notable risk exposure pathway that warrants additional characterization. However, prior to the current effort, there had been more than ten years since the previous tissue sampling event in 2008/2011. The results from the Fall tissue sampling help to understand the CSM and communicate risk. However, the subpopulation of smallmouth bass, and the associated tissue concentrations may differ in the spring due to differences in fish movement and water flow through the forebay. Sampling at this time will be used to support refinement of the CSM, provide a more robust dataset for comparison with historical data, communicate current conditions at the Site and inform future sampling efforts and baseline development. Analyzing fish tissue samples during a spring collection effort will provide a strong representation of the concentration range and potential variability present in bass. This collection effort will also serve as a valuable data point for future monitoring efforts. Seasonal variability for several parameters, including overall body mass, relative liver mass, lipid content, and the reproductive life cycle is a documented occurrence for smallmouth bass in the Columbia River (Rose, et.al., 2013). Smallmouth bass are semi-dormant during the winter when water temperatures are low. As temperatures increase during the spring, feeding and migration increase. These factors could reasonably be anticipated to influence chemical body burden in smallmouth bass near Bonneville Dam. The goal of this study is not to decern which factors influence contaminant body burden, but rather to determine if spring conditions influence contaminant body burden of the spring subpopulation. This information has been added to Section 1.2.2 of the QAPP. USACE suggests reviewing the statistical analysis provided with the previous sampling effort (QAPP, August 2020) for the supporting power analysis, which identifies the detectable differences achievable with the target sample size. An additional power analysis is provided as an appendix to this current QAPP to address the specific objectives of the seasonal sampling and incorporates the variability seen in the fall 2020 sampling.
2.	The Corps has not prepared a comprehensive tissue sampling and analysis plan that describes a sampling approach which will appropriately account for seasonal and interannual variation in sampling results. Tissue sampling to date has not been performed in a structured or statistically defensible manner that includes sampling events in each season and over a period of more than a single year. To date three events have been performed as part of the	USACE suggests reviewing the statistical analysis provided with the previous sampling effort (QAPP, August 2020) for the supporting power analysis, which identifies the detectable differences achievable with the target sample size. An additional power analysis is provided as an appendix to this current QAPP to address

	initial remedial investigation for the River Operable Unit (2006); after the non-time critical sediment removal action (2011); and a decade later after the non-time critical removal action (2020). The results of all three sampling events continue to indicate that Bradford Island remains a major source of polychlorinated biphenyls and heavy metals in aquatic tissue and resulting concentrations in biota remain orders of magnitude above the screening levels. As a result, regardless of what analytical results are reported for the proposed discrete sampling event in 2022, it will not be possible to credibly evaluate whether those same results represent a meaningful trend in concentrations of hazardous substances in aquatic tissue or are simply a seasonal or interannual anomalies that were not previously detected. Without correcting this fundamental deficiency in the sampling program design, and planning for multiple successive events that are consistently scheduled and performed; the results will, more likely than not, simply become a point of contention and disagreement between the Corps and other parties regarding what they represent.	the specific objectives of the seasonal sampling and incorporates the variability seen in the fall 2020 sampling. USACE agrees that Bradford Island represents a notable source of contamination to fish tissue. The intent of this study is intended to provide a more robust dataset given that, prior to the current effort, there had been more than ten years since the previous tissue sampling event in 2008/2011. Concentrations between 2020 and 2022 are unlikely to appreciably decrease as a result of time, and instead provides an opportunity to inform the potential for seasonal differences in the total contaminant body burden.
3.	We respectfully request better communication from the Corps on topics like this Work Plan in order to truly allow for meaningful engagement. There is a pool of expertise available in the TWG to help ensure efforts such as this Work Plan design select and meet appropriate goals and objectives. For example, to enhance the working relationship: a.) Provide an advance heads-up and opportunity for discussion on new and important efforts such as this Work Plan. YN and other Technical Working Group (TWG) members were completely unaware of the Corps plans to do round 2 bass sampling/tracking until we received the draft Work Plan on January 31, 2022. According to email communication with Daniel Carlson, USACE mentioned the possibility of a second round in August 2020 (1.5 years ago). b.) In addition to advance discussion, planning should allow adequate timelines for resolution of comments (ex. follow-up questions, open discussion), if warranted. The Project Timeline presented does not appear to allow for any substantive changes based on comments received. The Table 8 schedule allows for 7 days to resolve any significant concerns raised during the comment period by finalizing the Work Plan and field work begins 14 days after comments received. c.) Provide TWG members the same level of relevant background information (data, analysis, interpretations) as is available to the Corps. For example, the TWG has received the round 1 data report, but we understand that since then additional PCB congener data has likely become available that has not been shared with the TWG. Has this data been evaluated by the Corps? Has a data gaps/uncertainty analysis been conducted to support the round 2 Work Plan? In addition, round 1 fish tracking data and interpretations were published in October 2021, yet the TWG was not made aware of this by the Corps. A TWG member happened to find this report in February 2021.	a. comment noted. b. comment noted. c. USACE generally releases data reports and data analyses once they have undergone relevant validation and internal reviews for quality control. Additional PCB congener data has not undergone data validation to date but will be released once validation is complete. Additional data analysis and interpretation is ongoing and will be released once internal review is complete.
4.	Work Plans should be complete. For example, Table 5 laboratory detection/reporting limits are left blank. In addition, no screening levels, decision criteria, or SOPs are provided. This is critical information to provide in advance in order to evaluate the adequacy of a Work Plan. Will the Corps use an accredited lab?	USACE has now finalized the details of the contract for laboratory analysis. Table 5 is now populated. The commercial laboratory performing analyses holds DoD ELAP-accreditation for all methods for solids. The accreditation certificate is provided as an appendix. Columns have been added to Table 5 indicating the SLV for subsistence fishers and CTLs/ATLs for ecological receptors. All DLs are below the SLVs and CTLs/ATLs for all contaminants except for the human health SLV for dieldrin. DLs for alpha-BHC and delta-BHC (0.88 and 0.9 µg/kg, respectively) are only slightly elevated above the human health SLV 0.72.
5.	We have significant concerns about the reference area. a.) The north shore has past uses and potential sources of PCBs. For example, at the north end of the spillway on Cascades Island we understand historical operations included a gate repair pit, as well as sandblast and painting activities for spillway gates. It is unclear to us how well this area has been evaluated. Existing data in this area do indicate screening level exceedances. b.) The boundary of the northern reference area includes islands (Boat Rock and Picture Rock) near the tip of Bradford Island may be influenced more directly by Bradford Island contamination. The appropriateness of	The location of the reference area within the forebay of Bonneville Dam was determine based on extensive coordination and feedback from external technical reviewers, including Yakama Nation, Oregon DEQ, and US Fish and Wildlife Service during development of the sampling plan to support fall of 2020 collection efforts. In order to meet the objectives of the study for assessing potential seasonal variability, moving of the reference area for this round of sampling is not preferred as it would introduce a potential confounding variable into the dataset.

	these boundary lines with respect to this area should be evaluated looking at available data for this area (fish and other media). c.) It does appear that the northern shoreline fish tissue concentrations may be lower in general than the southern shoreline; however, fish tissue and sediment concentrations are still elevated in this area (7/2/2012, USACE Draft Analytical Results for Sediments, Clams and Bass collected from the Forebay and 6/2016 RI figures 9-14 and 9-15 series). We question the appropriateness of using this area or the Cascade Locks area due to the presence of contaminant sources in both areas.	Based on preliminary review of the fall 2020 sampling results, there are several fish collected within the reference area that would be considered outliers and not included in the final dataset representative of reference area concentrations.
Sky Environmental / Carlton Environmental (on behalf of Yakama Nation)		
1.	Section 1.2.2 does not provide a clear path for why this additional sampling is necessary. This section should draw upon previous work (with clear references), describing findings from previous reports, calling out specific data gaps that are pertinent to and in support of gathering this additional information, and specifically how this new information will fulfill those data gaps. How will this new information build upon the 2020 smallmouth bass data that has yet to be evaluated? Was there something observed within that data set that indicates additional data specific to smallmouth bass are needed?	Seasonal variability for several parameters, including overall body mass, relative liver mass, lipid content, and the reproductive life cycle is a documented occurrence for smallmouth bass in the Columbia River (Rose, et.al., 2013). Smallmouth bass are semi-dormant during the winter when water temperatures are low. As temperatures increase during the spring, feeding and migration increase. These factors could reasonably be anticipated to influence chemical body burden in smallmouth bass near Bonneville Dam. This study aims to confirm if these physiological variations have a notable influence on body burden. This information has been added to Section 1.2.2 of the QAPP.
2.	Section 1.2.2 states that "The intent of this data is to help inform the current site conditions for the River OU to aid in development of remedial action alternatives in the feasibility study." How specifically will this data be used to further define remedial action requirements/alternatives? YNF's comments on the 2020 tissue QAPPs hold true for this QAPP: *"Smallmouth bass are principally useful as broad-scale indicators of contamination, as well as useful for monitoring risks to consumers of those fish, but, because of their migratory habits they have more limited use in locating source areas."* *"Sampling sessile and small range receptors such as clam and sculpin, which were collected and analyzed in previous studies, would be more appropriate to identify and pinpoint source areas of contamination."* Further illustrating smallmouth bass as a broad-scale indicator, the USGS telemetry study indicated that of the 40 tagged smallmouth bass monitored August through December in 2020, 25 (almost 63 percent of the study population) moved upstream or downstream of the detection arrays/study area and did not return (*Behavior and Movement of Smallmouth Bass [Micropterus dolomieu] in the Forebay of Bonneville Dam, Columbia River, August-December 2020*, by T.J. Kock, G.S. Hansen, and S.D. Evans). Given this data, it is unclear why resources are being focused on another round of telemetry and smallmouth bass sampling, rather than focusing efforts on collecting smaller range species such as clam and sculpin.	USACE believes fish tissue consumption is a notable risk exposure pathway that warrants additional characterization. The results from the Fall tissue sampling help to understand the CSM and communicate risk. However, the subpopulation of smallmouth bass, and the associated tissue concentrations may differ in the spring due to differences in fish movement and water flow through the forebay. Sampling at this time will be used to support refinement of the CSM, provide a more robust dataset for comparison with historical data, communicate current conditions at the Site and inform future sampling efforts and baseline development. Clams and sculpin were collected in successful numbers during the fall 2020 sampling event. Clams were collected in two separate phases, with concentrated sampling along the northern shoreline of Bradford Island as well as other locations around Bonneville Dam and upstream, providing a robust dataset for analysis. The datasets for clam and crayfish tend to exhibit less variability, and the previous collection effort is sufficient for updating the CSM.
3.	Bass shouldn't be the sole-focus species, other species should be included (e.g., clam, crayfish, sculpin). Sampling for clam and/or crayfish on the Washington side of the river should occur. Why did the 2020 study not include samples for clam and/or crayfish on the Washington State side? Why does this 2022 study not include sampling for clam and/or crayfish to fill this data gap on the Washington State side and to provide additional information to compare to 2020 data?	Bass are a notable risk exposure pathway that warrants additional characterization and increased sample numbers. USACE collected a large number of clams and crayfish in 2020 and believe sufficient data is available for those biota. Clams were collected in two separate phases, with concentrated sampling along the northern shoreline of Bradford Island as well as other locations around Bonneville Dam and upstream, providing a robust dataset for analysis. The 2020 sampling was originally intended to reoccupy similar locations for collection based on the Remedial Investigation. Some revisions to collection locations were made based on feedback from external technical reviewers, including Yakama Nation, Oregon DEQ, and US Fish and Wildlife Service. Bass collection was attempted along the Washington shoreline in 2020, but catch rates were very limited with only 9 bass captured along the Washington shoreline.

4.	Section 1.3.1 states "The overall goal of this tissue collection effort and telemetry is to update and confirm the conceptual site model presented in the Remedial Investigation." Then goes on to state "This field effort for spring of 2022 is intended to provide information on potential seasonal variability in tissue chemical concentrations and movement." Why are seasonal differences for smallmouth bass important for the development/refinement of the conceptual site model when resulting tissue data are likely to under-represent tissue contaminant levels?	Additional tissue collection is warranted because it has been more than ten years since the previous tissue sampling event and the current 2020/2022 effort. The fish tissue consumption is a notable risk exposure pathway that warrants additional characterization. Analyzing fish tissue samples during a spring collection effort will provide a strong representation of the concentration range and potential variability present in bass. This collection effort will also serve as a valuable data point for future monitoring efforts.
5.	Section 1.3.1 also states "In light of the length of time since previous sampling efforts, this data may be used to update the risk assessment and provide current risk communications to tribal and recreational fishers in the area." This statement is confusing considering that smallmouth bass were collected only two years ago, and the data have not been evaluated yet. Is the intent of this statement to indicate one of USACE's goals is to update current fish advisories with this data? For fish contaminant monitoring programs, EPA recommends that neither undersized juveniles nor spawning populations be sampled for fish contaminant monitoring studies (*U.S. EPA Guidance for Assessing Chemical Contamination Data for Use if Fish Advisories, Volume 1, Fish Sampling and Analysis, Third Edition, EPA* *Document 823-B-00-007, November 2000;* Page 3-30). Fish tissue collection is typically avoided during this time-frame due to adipose tissue losses that occur during spawning activities, which result in lower than typical body burden for lipophilic organochlorine compounds such as PCBs and pesticides. We do not recommend including this upcoming 2022 data, which will under-represent typical tissue concentrations due to the time of year collected, in any evaluations associated with fish advisory development or modification.	Depending on the results of the tissue sampling, this data may be incorporated into an updated calculation of risk if no discernably different chemical body burden be detected. This inclusion would provide a more robust dataset to inform the exposure point concentration. However, if there are discernable differences in body burden, the seasonal datasets would remain separate. These results could subsequently support more robust risk communication.
6.	Section 1.3.1 states "Organochlorine pesticides were identified for analysis in tissue based on concentrations in bass tissue that contributed a notable fraction to overall risk. However, there is uncertainty if the elevated concentrations are attributable to site exposures or the result of matrix interferences during analysis. As such, analysis for organochlorine pesticides for this field effort will help to confirm its role in risk." To meet this DQO, organochlorine pesticides will need to be analyzed by high resolution methods using EPA Method 1699. Using this more sensitive method for organochlorine pesticides minimizes detection limit issues, PCB coelutions, and tissue matrix interferences.	Based on the results of the fall 2020 sampling event, detection limits for organochlorine pesticides using Method 8081 were sufficiently low to meet the study objectives and additional cleanup steps performed by the laboratory helped to reduce PCB interference. The same cleanup methods will be required for this round of sampling. Columns have been added to Table 5 indicating the SLV for subsistence fishers and CTLs/ATLs for ecological receptors. All DLs are below the SLVs and CTLs/ATLs for all contaminants except for the human health SLV for dieldrin. DLs for alpha-BHC and delta-BHC (0.88 and 0.9 µg/kg, respectively) are only slightly elevated above the human health SLV 0.72.
7.	Once DQOs are clarified and the performance criteria provided, the alternative actions for when performance criteria are not met should be clearly described.	The project quality objectives (PQOs) are established in Table 4, and the performance and acceptance criteria are evaluated in Step 6 according to the procedures described in Section 5. Please see section 5.1 for the summary of the review (Data Verification, Data Validation, and Data Usability Assessment) and subsequent sections for further description of those items. If performance criteria are not met, data will be flagged according to the appropriate data validation guidelines for that method and condition, and data usability will be evaluated.
8.	When will tissue detection limits, reporting limits, and screening level values (SLVs) be provided for review? This is critical information needed to ensure that the analytical DQOs can be achieved and to ensure that analytical reporting limits are well below the tissue SLVs.	USACE has now finalized the details of the contract for laboratory analysis. Table 5 is now populated. The commercial laboratory performing analyses holds DoD ELAP-accreditation for all analyses for solids. Columns have been added to Table 5 indicating the SLV for subsistence fishers and CTLs/ATLs for ecological receptors. All DLs are below the SLVs and CTLs/ATLs for all contaminants except for the human health SLV for dieldrin. DLs for alpha-BHC and delta-BHC (0.88 and 0.9 µg/kg, respectively) are only slightly elevated above the human health SLV 0.72.
9.	Table 4 Project Quality Objectives (PQOs) a. Table needs to be updated to reflect 2022 sampling (in addition to the 2020 sampling data objectives already included in the table). See previous comments regarding details to provide for objectives.	a. PQOs 1 through 3 capture the objectives of the 2020 study and are also applicable to the 2022 effort. PQOs 4 and 5 reflect the objectives for assessing seasonal variability. b. Text was added to PQO 4 accounting for additional variables in bass.

	b. Table 4 data comparisons should take into account other variables such as fish sex, age/size/weight, presence of eggs/mature gonads, and lipid content. c. Table 4 PQO #4(seasonal differences) should acknowledge that fish tissue contaminant levels collected in the Spring/early Summer are likely to under-represent tissue concentrations per previous comments.	c. The intent of PQO 4 is to confirm if spring tissue levels are discernably lower than fall tissue. It is unknown yet if this is true. No change made to the text based on this comment.
10.	Table 5 can not be reviewed without detection limits or reporting limits. This table should also include tissue SLVs in a column adjacent to the reporting limits. As mentioned previously, organochlorine pesticides should be analyzed via EPA Method 1699 in order to meet DQOs.	USACE has now finalized the details of the contract for laboratory analysis. Table 5 is now populated. The commercial laboratory performing analyses holds DoD ELAP-accreditation for all analyses for solids. Columns have been added to Table 5 indicating the SLV for subsistence fishers and CTLs/ATLs for ecological receptors. All DLs are below the SLVs and CTLs/ATLs for all contaminants except for the human health SLV for dieldrin. DLs for alpha-BHC and delta-BHC (0.88 and 0.9 µg/kg, respectively) are only slightly elevated above the human health SLV 0.72.
11.	Table 6 (Sampling Summary) a. MS/MSDs are redundant for PCB congeners and are not required per EPA Method 1668 (every sample contains labeled isotopes). The same would apply for organochlorine pesticides if the recommended EPA Method 1699 were used. b. Please see comments below regarding field duplicates versus homogenization splits. c. Please include equipment rinse blanks in this table for tissue processing equipment. d. Please provide separate rows for each of the separate areas to be sampled (Bradford Island, Goose Island, North River) to ensure that the appropriate number and types of samples are collected from each area.	a. Comment noted. b. Please see discussion in Comment #23 below. c. Equipment rinse blanks are not applicable as whole organisms will be submitted to the laboratory, so there is no dissection equipment utilized. Bass will be collected by angling (fishing), and contamination from hook and line is not expected as the hook and line will be in the river prior to contact with the bass. Representative samples of bait will be analyzed and stomach lavage will be performed to empty the bass stomach contents. d. Table 6 has been revised per the comment.
12.	Table 7 Project Tasks a. Documentation and Records section is missing important fish field data such as length, weight, sex, presence of eggs/mature gonads. Document all gear type (lure or bait) for all fish caught and sampled. b. Data Validation and Data Packages should specify that a complete data package (supporting an EPA Stage 4 data validation will be provided. c. Data Review Tasks reference for USEPA CLP Functional Guidelines is out of date and needs to be updated to most current version. This section of the table should also include the most recent versions of USEPA CLP Functional Guidelines for inorganics as well as high resolution methods.	a. Table 7 and the field form in appendix B have been updated. While USACE agrees that sex and presence of eggs/mature gonads could play a factor in the chemical body burden associated with seasonal variability, it is important to not puncture/cut fish samples in the field prior to conducting chemical analysis (due to the increased potential for material loss from the sample). b. Text added. c. Table 7 and references to the EPA National Functional Guidelines have been updated. That section of Table 7 (Data Review Tasks) is intended to be a broad summary of the details presented in Section 5.
13.	Key sampling and processing details/standard operating procedures are missing from this section. Sufficient details should be provided such that the sampling could be repeated using the exact same methods for collection and processing. This could be provided in the form of standard operating procedures in an appendix. There are no details for where (at the analytical lab?) the samples will be processed, how the stomach contents of the fish will be removed, how or if eggs/gonads will be removed/archived/sampled, how implements/equipment will be decontaminated between processing samples, how whole body fish will be homogenized, how associated processing equipment blanks will be collected.	Additional sampling and processing details have been added in section 2.12 of the QAPP and Appendix A. Decontamination procedures are specified in Section 2.1.4. Gastric lavages is noted as the method for removing stomach content and is specified in Section 2.1.2 and Appendix A. Equipment rinse blanks are not applicable as whole organisms will be submitted to the laboratory, so there is no dissection equipment utilized. Bass will be collected by angling (fishing), and contamination from hook and line is not expected as the hook and line will be in the river prior to contact with the bass. Representative samples of bait will be analyzed and stomach lavage will be performed to empty the bass stomach contents.
14.	Reference Tissue a. How is a reference area that has reported contamination and is so close to contaminated areas appropriate? b. This was brought up by all groups, including YNF, as an issue in their respective comments on the 2020 study as well. c. Perhaps this area should be referred to as the North River OU rather than the Reference Area, since a consensus has not been reached on this being an appropriate reference area. d. What is the minimum number of reference fish that will be allowed if catch rates are low?	a. The location of the reference area within the forebay of Bonneville Dam was determine based on extensive coordination and feedback from external technical reviewers, including Yakama Nation, Oregon DEQ, and US Fish and Wildlife Service during development of the sampling plan to support fall of 2020 collection efforts. In order to meet the objectives of the study for assessing potential seasonal variability, moving of the Reference area for this round of sampling is not preferred as it would introduce a potential confounding variable into the dataset. This reference location helps to concentrate resources and collection efforts in the area of interest. It was acknowledged prior to fall 2020 sampling that any background reference area will have issues with outlier concentrations, and that statistical analysis could be used to address this concern. Based on the data collected in fall 2020, there does appear to be a subset of bass that potentially represent a background

		or ambient concentration for PCBs, with a break in concentrations that may be indicative of source contamination. Further statistical analysis of the data will help to confirm and refine this statement. b. The reference area used in the fall 2020 sampling and for use in the upcoming sampling effort was based on discussions and coordination with external technical reviewers. The original reference locations proposed by USACE was similar to the reference area used in support of the 2012 Remedial Investigation. Based on external feedback, the reference area was moved to its current location. c. Establishing the forebay as the reference area was based on extensive coordination with external technical reviewers in preparation for the fall 2020 sampling. No changes are made to the reference area for this sampling effort. d. 20 Reference fish are required for chemical analysis. 20 are also required for representation of Goose Island. There is a Target of 40 fish for representing Bradford Island, but a minimum of 20 will be targeted if catch rates are low.
15.	Why does the average size range for chemical analysis (150 mm to 400 mm) not match the size range for the acoustic study (200 mm to 400 mm)?	The intent is for the size range to be consistent for both the chemical analysis and acoustic study. The text has been updated to state fish size greater than 150mm is targeted. The implementation plan (Appendix B) was updated to correct this discrepancy.
16.	Smallmouth bass have a general life span of 6 to 15 years. Are the targeted lengths adequate to collect older fish or are younger fish being targeted?	Text referencing length of fish has been updated to indicate fish greater than 150mm will be targeted. The threshold of 150mm is generally considered to capture "adult" smallmouth bass and should roughly correspond to one year old fish.
17.	Smallmouth bass larger than 400 mm should be retained and analyzed as they could represent older fish populations. EPA recommends use of the largest (oldest) individuals in the target species to represent the highest likely exposure levels (*U.S. EPA Guidance for Assessing Chemical Contamination Data for Use if Fish Advisories, Volume 1, Fish Sampling and Analysis, Third Edition, EPA Document 823-B-00-007, November 2000;* Page 2-12). Must use same class/age size fish for reference and study area – adult fish should be used for both the "reference"/North River OU area and study area.	Concur. The text has been changes to state fish greater than 150mm are targeted. Fish larger than 400mm will be retained and analyzed. During the fall 2020 effort, five fish greater than 400mm were retained any analyzed. As stated in Section 2.1.2, "However, bass out of this range may also be retained, especially if abundance is low. An effort will be made to tag bass proportionally throughout the size range. "
18.	Must identify sex of each fish.	While USACE agrees that sex and presence of eggs/mature gonads could play a factor in the chemical body burden associated with seasonal variability, it is important to not puncture/cut fish samples in the field prior to conducting chemical analysis (due to the increased potential for material loss from the sample).
19.	Females with eggs and males with mature gonads should be documented.	While USACE agrees that sex and presence of eggs/mature gonads could play a factor in the chemical body burden associated with seasonal variability, it is important to not puncture/cut fish samples in the field prior to conducting chemical analysis (due to the increased potential for material loss from the sample).
20.	Will eggs/gonads, if present, become part of the whole-body composite samples? If not, will the samples be archived?	While USACE agrees that sex and presence of eggs/mature gonads could play a factor in the chemical body burden associated with seasonal variability, it is important to not puncture/cut fish samples in the field prior to conducting chemical analysis (due to the increased potential for material loss from the sample).
21.	Will stomach content be analyzed for? If so, what will be analyzed? If not, all stomach content should be archived for individual fish collected for potential chemical analysis.	Stomach content will be retained if sufficient mass is collected (>40g) and archived for up to one year. Selection of any chemical analyses for stomach content
22.	Will all leftover fish tissue be archived? If so, for how long?	Bass are not intended for archiving. Stomach contents, if collected, will be archived for 1 year.
23.	Section 2.3.1 (Field Quality Control Samples) needs to include more detail: a. Field Duplicates – how will field duplicates be collected and processed? Do field duplicates make sense if you are collecting individual fish for analysis? Perhaps it would make more sense to collect a homogenization split instead? b. Equipment Rinse Blanks – There will be equipment that is reused throughout the fish tissue homogenization and equipment rinse blanks should be collected.	a. For field duplicates, the laboratory will homogenize the sample and then split the homogenate into a primary sample and a field duplicate sample prior to analysis. This has been added to section 2.1.2. Unlike a water or soil sample, individual fish may not be able to be collected at the "same" location, and if fish are able to be collected at the "same" location they may have had different typical locations causing variability that would be greater than the variability reflected in a field duplicate for a non-living matrix like water or soil. b. Equipment rinse blanks are not applicable as whole organisms will be submitted to the laboratory, so there is no dissection equipment utilized. Bass will be collected by angling (fishing), and contamination from hook

		and line is not expected as the hook and line will be in the river prior to contact with the bass. Representative samples of bait will be analyzed, and stomach lavage will be performed to empty the bass stomach contents. Laboratory procedures will be discussed in the laboratory case narratives.
24.	Data Analysis – There is no section describing details for how the data will be evaluated against the "reference"/North River OU area or how USACE plans on evaluating with respect to historical data. a. What range of statistical tests will be used? b. Contaminant concentrations must be compared to lipid content and size of fish collected. Gender of fish must be documented. c. There are a number of data exploratory methods available that are useful in discerning similarities and differences among the samples that may be useful in clearly identifying highly or uniquely contaminated samples. Those methods should be described in the WP-QAPP.	a. Statistical tests will vary depending on the distribution of the data. However, Step 5 of Table 4 indicates that statistical tests will include a comparison of site versus reference, historical versus current, fall versus spring, as well as tests for outliers and a visual evaluation of the data. Text was added to Section 1.3.1 to state ProUCL software will be the primary platform for analyses. b. Data analysis will account for length, weight, and lipid content. Because identifying gender of fish would require puncturing/cutting the fish, USACE is omitting that parameter so not to compromise results of chemical analysis through potential loss of material. c. An outlier test is noted for analysis. Specific exploratory methods will be considered later during data evaluation.
25.	Similar to the WP-QAPP, insufficient details are provided regarding sample collection procedures, but only specifies that "At the time of collection, individual fish will be immediately euthanized using the club method described in EPA (2000), externally marked for individual identification with a unique identification number, measured for fork length to the nearest centimeter, and placed in a cooler with ice." This implies that collected fish with somehow be marked (but we don't know how), will be measured, then placed directly on ice in a cooler (not wrapped in foil, double bagged in plastic, and labeled as described in the WP-QAPP), etc. As written, these procedures do not represent appropriate sample handling procedures for the collection of fish tissue for chemical analysis and conflict with what is presented in the body of the WP-QAPP.	Text in Section 2.1 and Appendix A have been updated with additional details.
26.	A sample size of 40 fish may not be adequate to determine typical home range and spatial and temporal patterns of smallmouth bass. The 2020 USGS study shows 40 fish tagged but only 36 tracked. Also, 25 of those fish moved upstream or downstream of the arrays, out of range of detection.	Forty fish for an acoustic telemetry study is a typical sample size for this type of study and has been performed previously by USGS. The 2020 tracking study also targeted 40 fish and that sample size proved to show discernable trends in fish movement.
27.	The field form is missing columns/spaces for weight, sex, eggs/gonads, and equipment/bait used.	The field form in Appendix B has been updated to include the weight parameter. Use of equipment/bait will also be noted.
28.	The last figure provided in Appendix A is missing titles and legends. What do the red circles signify?	Similar to other figures in the QAPP and appendix, the title for figure 3 is at the bottom of the page immediately below the image. As indicated in the title, acoustic receivers are denoted by red circles. The scale is provided within the body of the picture. No changes to the figure are made based on this comment.
29.	When will a thorough review of the 2020 study data be completed – including review/analysis of 209 PCB congener data?	USACE anticipates analysis of the 2020 fish tissue sampling results to be available for review in mid to late 2022. This data analysis may incorporate the results of the 2022 sampling as well.
30.	Did the 2020 study include analysis of 209 PCB congeners? If so, when will that data be available for review? If not, how will this 2022 study which includes 209 PCB congener analysis be comparable to 2020 data?	PCB congener analysis was performed for the 2020 fish tissue. Per the final QAPP (August 2020), because ERDC was only able to quantify approximately 150 congeners, a subset of samples were sent to a subcontracted laboratory for full 209 analysis (with coelutions). ERDC's results were provided previously in a data report. Results from the subcontracted laboratory are still undergoing data validation and will be publicly released once data validation is complete. The commercial lab contracted for the spring 2022 field effort will be able to quantify all 209 congeners (with coelutions).
Oregon DEQ		
General Comments		
1.	Data Quality Objectives, 2020 Fish Sampling Work Plan and Response to Comments: The work plan and response to comments state that the primary purpose of the sampling effort is to update and reconfirm the original conceptual site model presented in the remedial investigation. Further statements are made that the "tissue data will be used to update site risks", to "evaluate changes in COC concentrations over time" (RTC #12), and that an "evaluation of results will require a line of evidence approach assessing multiple media, including previous passive sampling efforts, these tissue studies, and future sediment collection." (RTC #38)	a. ERDC was able to quantify approximately 150 congeners, which also correspond with those congeners most commonly detected in environmental media. A subset of samples from the fall 2020 effort were also sent to a commercial laboratory for full 209 analysis (with coelutions), which will provide additional support regarding the level of accuracy ERDC's analyses provide. For this upcoming spring sampling, a commercial lab capable of analyzing all 209 congeners (with coelutions) is contracted for the analysis.

	a.) Data may not be available meet the objectives above, primarily because a complete list of PCB congeners was not analyzed as a part of the most recent effort for direct comparison to tissue concentrations measured in the remedial investigation. b.) DEQ believes the 2021 tissue report and USGS tracking report provide sufficient evidence that total PCBs originating from exposure to Bradford Island media is the primary risk driver (RTC #12) to all levels of the food web recently characterized (sediment, passive sampling results, clam, crayfish, and smallmouth bass). c.) Although only a subset of PCBs was analyzed and presented in the most recent tissue report, the relative ranking of total PCBs by sample location between the Bonneville Pool and Cascade Locks confirms the conclusion that Bradford Island is the primary source of total PCBs to the food chain.	b. USACE believes fish tissue consumption is a notable risk exposure pathway that warrants additional characterization. However, prior to the current effort, there had been more than ten years since the previous tissue sampling event in 2008/2011. The results from the Fall tissue sampling help to understand the CSM and communicate risk. However, the subpopulation of smallmouth bass, and the associated tissue concentrations may differ in the spring due to differences in fish movement and water flow through the forebay. Sampling at this time will be used to support refinement of the CSM, provide a more robust dataset for comparison with historical data, communicate current conditions at the Site and inform future sampling efforts and baseline development. c. See response to b) above.
c.	Data Quality Objectives, Spring 2022 Fish Sampling. Table 4, Project Quality Objectives: A section was added to include objectives around an evaluation of seasonal differences in bass tissue between Site and Reference. DEQ's objectives for characterizing bass tissue and movement are to determine where primary fish exposure occurs and "to understand potential source areas for fish" (USACE, 2021). In terms of diet and habitat for smallmouth bass, the focus should be on the habitat areas and dietary source occupied during the majority of the lifecycle, not during spawning season when the fish are using different habitat for a short period of time, and when they are not expected to be feeding. Smallmouth bass habitat is primarily rock, boulder or gravel habitat with limited vegetation, which is not spawning habitat. It is therefore unclear how a fish sampling effort during spawning season will help meet these goals. a.) Spawning typically occurs mid-April to July, depending on water temperature (nest building and spawning occurs 12.8 - 21 degrees Celsius). Smallmouth bass spawn in shallow backwater or move into creeks or tributaries. The spring proposed scope of work is directly in line with this spawning period, and therefore catch and tracking will be more likely correlated with spawning behavior and not accurately reflect their exposure habitat and body burden. Bass do not feed during spawning periods (although they still may bite a fisherman's line). This can be misleading in interpreting connections between exposure and tissue residues. Studies where this is a primary objective are therefore discouraged during this timeframe in order to avoid making inaccurate conclusions. See *Habitat Suitability Information: Smallmouth Bass*, FWS/OBS-82/10.36, September 1983. b.) Complications with length versus weight relationships due to gravid females can occur during this time. The sex of fish should be determined if possible, and gravid females noted. Both length and weight should be recorded.	a. Comment noted. The goal of this study is to characterize spring season bass to see if contaminant body burdens are appreciably different from fall. This effort will also lend itself to providing a more robust dataset in the event that tissue concentrations are not statistically different between spring and fall sampling. b. length and weight of each fill will be recorded.
Specific Comments		
1.	<u>Bradford Island and Reference Sampling Locations:</u> a. <u>Smallmouth Bass</u>: Fish collected in the Boat Rock, Picture Rock, and Cascades Island Zones were shown to spend time at Bradford Island or Goose Island, and therefore may contact site-related contamination. These fish cannot be considered from "a separate population than those bass impacted by contamination from Bradford Island" (Draft work plan and QAPP, Summer 2020 and Spring 2022, Table 4 PQOs). Revise Figure 1 and Associated Text in the *Smallmouth Bass, Crayfish, and Clam Data Report, Oct. 2021* and Revise Figure 3 in the *Draft Workplan with QAPP for Smallmouth Bass Acoustic Telemetry and Tissue Sampling for Spring 2022 Spring Bass QAPP* to exclude Picture Rock, Boat Rock, and Cascade Island areas from the population of fish considered exposed to a reference condition. Fish considered a separate exposure population (potentially reference) should focus on those that spent no time in Bradford or Goose Island Areas, which are fish collected on the North Shore of the Columbia River (Washington State).	a. Comment noted. In order to maintain consistency with the previous sampling effort, the reference area will remain consistent from the previous sampling effort in fall 2020. This reference area was collectively agreed to with external technical reviewers. This reference location helps to concentrate resources and collection efforts in the area of interest. It was acknowledged prior to fall 2020 sampling that any background reference area will have issues with outier concentrations, and that statistical analysis could be used to address this concern. Based on the data collected in fall 2020, there does appear to be a subset of bass that potentially represent a background or ambient concentration for PCBs, with a break in concentrations that may be indicative of source contamination. Further statistical analysis of the data will help to confirm and refine this statement. b. comment noted. Clams were collected in two separate field efforts, with a Phase I reference offshore of the island, and a second collection effort during Phase II with a reference located upstream near Stevenson, Washington.

	a. Based on the USGS report *Behavior and Movement of Smallmouth Bass (Micropterus dolomieu) in the Forebay of Bonneville Dam, Columbia River, August-December 2020*, smallmouth bass caught and released at Boat Rock were primarily found at Goose Island (84.9% of the time), with 0.2% detected anywhere at Bradford Island. "Tagged smallmouth bass spent the greatest percentage of time in their zone of release in all zones except the Boat Rock zone; the five smallmouth bass released in the Boat Rock zone moved to the Goose Island zone, where the stayed most of the time" (USGS, 2021). b. Fish caught and released at Cascades Island and North Bradford Island were found to spend time in both places. For fish released at Cascades Island, 1.3%, 5.8%, and 2.8% were found at East, North & South Bradford, respectively; for fish released at North Bradford, 22% were detected at Cascades Island. b) Clams: *Smallmouth Bass, Crayfish, and Clam Data Report, Oct. 2021* and RTC: Reference locations for clams are too close to Bradford Island source areas to be considered "not impacted" by site contamination. Please revise associated text, tables, and figures (Figures 12 to 14).	
2.	Definition of Total PCBs, *Smallmouth Bass, Crayfish, and Clam Data Report, Oct. 2021* and RTC: A subset of 153 of the 209 PCB congeners was analyzed in 2021. This may significantly underestimate total PCBs using 209 congeners. RTC #16 and RTC #27 indicates "a subset of samples will be sent to a commercial lab capable of analyzing all 209 congeners by EPA Method 1668 to ensure no congeners are being missed". As mentioned in RTC #20, detections of PCB dioxin-like congeners are also of concern. DEQ would like to review the results of total PCBs by 209 congeners. Provide an update of this analysis and a schedule for the presentation of results. a.) Section 4.2, Comparison with Historical Data 2021 Tissue Report: Modify this section to remove statements that "the average tissue concentration in fish collected in 2020 was 17 times lower than those collected in 2008/2011, over an order of magnitude" and "similarly, the maximum total PCB concentration observed in 2020 was 16 times lower than the maximum observed in 2008/2011". b.) Modify Table 4-6 and Graph 4-1 to state that these total PCB results are not directly comparable. This information is misleading. The 2020 data is describing total PCBs by 153 congeners, and the 2008/2011 calculated total PCBs by 209 congeners. These values are not directly comparable to support conclusions regarding changes in concentration over time. c.) Provide lipid normalized analytical results for all analytes for individual samples, as this will be an important normalizing factor for any statistical analysis. Lipid content in smallmouth bass collected in 2020 ranged from 1.22% to 8.33%, which indicates the importance of making lipid adjustments before comparing concentrations.	a. Comment noted. ERDC was able to quantify approximately 150 congeners, which also correspond with those congeners most commonly detected in environmental media. A subset of samples from the fall 2020 effort were also sent to a commercial laboratory for full 209 analysis (with coelutions), which will provide additional support regarding the level of accuracy ERDC's analyses provide. USACE believes the statement is accurate. b. see response to a) above. c. Comment noted. Lipid normalization will be used in the data analysis
3.	Data Requests: a. Provide Google kmz files for the sample maps for import into Google Earth from the *Smallmouth Bass, Crayfish, and Clam Data Report, October 2021*, and the USGS report *Behavior and Movement of Smallmouth Bass (Micropterus dolomieu) in the Forebay of Bonneville Dam, Columbia River, August-December 2020*. b. Provide electronic data for individual fish movement collected in the USGS study. c. Provide electronic data (Excel) as a part of the Final Data Report for the Spring 2022 sampling (Section 4.2).	These data will be provided as separate deliverables from this response to comments.
4.	Lipid Normalization, 2021 Tissue Data Report and Spring 2022 work plan and QAPP: Lipid-normalized dioxin data: Measures of chemical bioaccumulation by fish may be used to assess differences in bioaccumulation between locations. Due to their hydrophobic characteristics, PCBs and other analytes of concern in these studies tend to accumulate in lipid-rich tissues. Because lipid content can vary significantly by the size and species of fish, methods used to directly compare the bioaccumulation between locations must consider normalization for lipid content before statistical comparisons can be made.	Comment noted. Lipid normalization will be used in the data analysis.

5.	Juvenile versus Adult Smallmouth Bass (USACE, 2021 report and future Spring 2022 work plan and QAPP): Juvenile fish represent a different population than adults because of differences in habitat and diet, and should not be included in the dataset of adult fish (*e.g.*, smallmouth bass samples SB2001 and SB2002, USACE, 2001).	Comment noted.
6.	Spring 2022 work plan and QAPP, Section 1.5: The text indicates that "sample collection in the Boating Restriction Zone (BRZ) is limited to the months of September to 10 April." Please provide a map of the BRZ in the work plan, and indicate which areas will not be available for sampling as a part of this work plan. The BRZ is a primary collection area of concern around Bradford Island. It is unclear from this workplan how much of the sampling will be completed by this date.	Sampling in the BRZ will be performed prior to April 10th, which spill commences. The intent is to collect 40 fish for chemical analysis and a subset of fish for acoustic telemetry. The BRZ is the portion of the forebay west of the eastern tip of the Island and Boat Rock.
7.	Spring 2022 work plan and QAPP, Table 3: The laboratory name is TBD. Specifics on laboratory detection limits and reporting limits are needed for evaluation.	Additional laboratory information has been added to the QAPP.
8.	Spring 2022 work plan and QAPP, Section 2.1.1: Appendix A includes the plan for implementing the tissue sampling and telemetry efforts. Confirm that relevant information such as powerhouse and spillway discharge times and rates will be reported during the tissue sampling period and telemetry monitoring.	USACE will include information related to powerhouse and spillway discharge times and rates.
9.	Spring 2022 work plan and QAPP, Section 5.3: Explicitly define the qualifier for EMPC.	A definition of EMPC and how data will be treated is provided in Section 3 and in Section 5.3.
10.	Analysis of Bass Stomach Contents: a. In the response to comment #10 on the 2021 Data Report, it is indicated that smallmouth bass stomach contents will be archived and submitted for chemical analysis when additional funds become available. Provide an update on this analysis. b. In the 2022 Spring work plan and QAPP, the text states (in Section 2.1.2) that stomach contents will be removed via gastric lavage, but it is not clear if analysis of the stomach contents will occur. Clarify that analysis of stomach contents will occur. DEQ notes that masses smaller than 40 grams could be analyzed, or the stomach contents of nearby fish could be composited.	a. Stomach contents are still being held on archive. However, minimal mass was collected for each individual stomach content sample. As such, USACE did not decide to run chemical analysis on any of those samples. b. Text added to Section 2.1.2 stating stomach contents will be archived and potentially analyzed at a later date. USACE will consider compositing stomach content for this spring effort to help achieve sufficient mass.
11.	Sculpin Analysis: In the response to comment #11, #13, and #43, it is indicated that if sculpin were collected, they would be archived and submitted for chemical analysis when additional funds become available. Provide an update and a schedule for this analysis.	Sculpin are still being held on archive. Only 15 sculpin were collected during the fall 2020 sampling effort. Given the small sample size, USACE elected to not perform chemical analysis on sculpin. If sculpin are collected during the spring 2022 effort, they will be retained and archived.
12.	Non-PCB COCs: DEQ remains concerned with the use of EPA Method 8081 for the analysis of pesticides given co-located detections of PCBs. Achievement of detection limits adequate for assessment is not the only goal; we also want to ensure proper chemical identification for co-eluting compounds. Non-PCB COCs like pesticides are confirmed to be present based on previous tissue sampling and the most recent soil results for the sandblast area soils. a. Because this comment was not incorporated in the 2020 sampling plan, provide the full analytical dataset to DEQ so this uncertainty can be assessed by the DEQ laboratory. b. For the spring 2022 analysis, analyze all fish according to the remedial investigation QAPP using EPA Method 1699.	a. The dataset will be provided as a separate deliverable from this response to comments. b. Based on the results of the fall 2020 sampling event, detection limits for organochlorine pesticides using Method 8081 were sufficiently low to meet the study objectives and additional cleanup steps performed by the laboratory helped to reduce PCB interference. Columns have been added to Table 5 indicating the SLV for subsistence fishers and CTLs/ATLs for ecological receptors. All DLs are below the SLVs and CTLs/ATLs for all contaminants except for the human health SLV for dieldrin. DLs for alpha-BHC and delta-BHC (0.88 and 0.9 µg/kg, respectively) are only slightly elevated above the human health SLV 0.72.
U.S. Fish and Wildlife Service		

1.	The work plan (page 14) states that "This field effort for spring of 2022 is intended to provide information on potential seasonal variability in tissue chemical concentrations and movement." It is not clear from the data quality objectives (DQOs) or text how this objective will be met, or how many samples would need to be collected or seasons would need to be sampled to clearly identify trends. Identifying seasonal variations with just two season worth of data will be difficult to achieve due to multiple sources of variation that will affect chemistry data.	Comment noted. USACE believes fish tissue consumption is a notable risk exposure pathway that warrants additional characterization. However, prior to the current effort, there had been more than ten years since the previous tissue sampling event in 2008/2011. The results from the Fall tissue sampling help to understand the CSM and communicate risk. However, the subpopulation of smallmouth bass, and the associated tissue concentrations may differ in the spring due to differences in fish movement and water flow through the forebay. Sampling at this time will be used to support refinement of the CSM, provide a more robust dataset for comparison with historical data, communicate current conditions at the Site and inform future sampling efforts and baseline development. Analyzing fish tissue samples during a spring collection effort will provide a strong representation of the concentration range and potential variability present in bass. This collection effort will also serve as a valuable data point for future monitoring efforts.
2.	Has a data quality assessment been conducted on the previous smallmouth data set? This would help determine if variability in samples was adequately characterized and if the number of samples for this proposed data set is representative (i.e., help refine the power curves established previously).	An additional power analysis is provided as an appendix to this current QAPP to address the specific objectives of the seasonal sampling and incorporates the variability seen in the fall 2020 sampling.
3.	Since smallmouth bass spawn around May, it may be important to sex fish and note reproductive condition. Spent females may have eliminated some lipophilic compounds such as PCBs along with the eggs, and this could add a source of variation especially if you collect and compare spent females vs females still holding eggs. This would also make it more difficult to identify seasonal variation.	While USACE agrees that sex and presence of eggs/mature gonads could play a factor in the chemical body burden associated with seasonal variability, it is important to not puncture/cut fish samples in the field prior to conducting chemical analysis (due to the increased potential for material loss from the sample). While information on sex and presence of eggs would help to illustrate
4.	It seems the line between reference and target areas in Figure 3 overlap more than desired, as fish may be moving around more pre- or during spawning. A more distinct separation between reference and target areas may be warranted.	In order to maintain consistency with the previous sampling effort, the reference area will remain consistent from the previous sampling effort in fall 2020. This reference area was collectively agreed to with external technical reviewers. This reference location helps to concentrate resources and collection efforts in the area of interest. It was acknowledged prior to fall 2020 sampling that any background reference area will have issues with outlier concentrations, and that statistical analysis could be used to address this concern. Based on the data collected in fall 2020, there does appear to be a subset of bass that potentially represent a background or ambient concentration for PCBs, with a break in concentrations that may be indicative of source contamination. Further statistical analysis of the data will help to confirm and refine this statement.
5.	The work plan notes that "Organochlorine pesticides were identified for analysis in tissue based on concentrations in bass tissue that contributed a notable fraction to overall risk. However, there is uncertainty if the elevated concentrations are attributable to site exposures or the result of matrix interferences during analysis. As such, analysis for organochlorine pesticides for this field effort will help to confirm its role in risk." The analysis for organochlorine pesticides should be conducted using high resolution methods to better resolve matrix interferences, attain desired detection limits, and avoid problems observed in the past when high resolution methods were not used.	Based on the results of the fall 2020 sampling event, detection limits for organochlorine pesticides using Method 8081 were sufficiently low to meet the study objectives and additional cleanup steps performed by the laboratory helped to reduce PCB interference. Columns have been added to Table 5 indicating the SLV for subsistence fishers and CTLs/ATLs for ecological receptors. All DLs are below the SLVs and CTLs/ATLs for all contaminants except for the human health SLV for dieldrin. DLs for alpha-BHC and delta-BHC (0.88 and 0.9 µg/kg, respectively) are only slightly elevated above the human health SLV 0.72.
6.	<u>Table 4:</u> Problem statement: More information should be added here (or in the text) regarding why these questions are important. From past bass and other data, we know that tissues at or near Bradford Island are elevated. A key data gap remains regarding how the bass are being exposed to PCBs, and how remediation would best get those numbers down. Are the questions listed here more important than finding out how the bass are exposed, or will help to answer that question? The questions posed here may be helpful but less relevant in getting to remediation of the site, so it would be good to pose questions relevant to remediation potential. Also, alternative actions should be described in this section. What actions will be taken if the answer to a question is yes? What actions will be taken if the answer to a question is no? This is a good way to help decide whether the question is important, because if the actions planned to be taken do not matter that much then maybe the question need not be asked.	Additional text was added to Section 1.3.1 to provide context and importance for this sampling effort. Regardless of the tissue results from this spring sampling effort, USACE has already confirmed that unacceptable risk is present, including through consumption of bass. Remedial action will be required, but the formulation of those alternatives will not be developed until the feasibility study. While alternative action cannot be formulated in the QAPP, these study questions are relevant in order to understand the CSM and communicate risk. Sampling at this time will be used to support refinement of the CSM, provide a more robust dataset for comparison with historical data, communicate current conditions at the Site and inform future sampling efforts and baseline development.
7.	<u>Table 4:</u>	Sample size is supported by the statistical analysis performed in support of the fall 2020 sampling effort (QAPP, 2020). An updated statistical analysis is also provided specific to the seasonal comparison and recent

	The information inputs in step 3 should also address measurements and media to be sampled and evaluate the usability of existing data along with an evaluation to see if the data fall within the range expected based on the conceptual site model. The inputs should also provide the justification of sample sizes, action levels (and basis for levels), detection limits required, control criteria, precision required (relative standard deviation) and accuracy required (percent recovery) and their acceptable limits.	range of concentration seen in fall 2020 bass. Relevant screening levels and associated DLs/RLs are provided in Table 5. Section 5.4 contains information related to precision, accuracy, and steps to assess the overall usability of the data.
8.	Table 4: Thought should be given in step 4 to defining the smallest, most appropriate subsets of the population or subpopulations for which decisions will be made, and establishing an exposure unit or area corresponding to the area where receptors derive majority of exposure, or a remediation unit or area which has been determined to be most cost-effective area for remediation. The target areas appear to be more like exposure areas, but has though been given as how these areas might be used in remediation?	The study design already designates the northern shoreline of Bradford Island as a targeted collection area due to the likely exposure to contamination for bass. It is not practical to further subdivide this exposure area further for bass collection. However, other areas separate from the northern shoreline of Bradford Island will rely on clams, crayfish, and sediment to identify more refined areas of potential exposure and subsequent remedial action.
9.	Table 4: Step 5 should clearly identify action levels used in the comparison or how action levels will be derived. For instance, a description of how tissue data will be compared to reference values, or how PCBs will be compared to a threshold value (and how that threshold value will be derived) should be outlined here.	In order to ensure DLs and RLs are at acceptable levels, columns have been added to Table 5 indicating the SLV for subsistence fishers and CTLs/ATLs for ecological receptors. All DLs are below the SLVs and CTLs/ATLs for all contaminants except for the human health SLV for dieldrin. DLs for alpha-BHC and delta-BHC (0.88 and 0.9 µg/kg, respectively) are only slightly elevated above the human health SLV 0.72. Action levels to guide remedial action are presented in the baseline risk assessments and will be used to guide risk management decisions and remedial action.
10.	Table 4: Step 6 should also include specifying error tolerances (specifying tolerable limits on decision errors limits uncertainty in the data). This should be where variability of each contaminant of concern is defined, as well as the decision errors and consequences of errors. The U.S. Environmental Protection Agency has very good guidance on how to do this step and why this approach is helpful.	The acceptable limits for performance and acceptance criteria are defined in the DoD QSM for many analyses, and if not defined there, the laboratory's method limits are used. This was added to Section 5.4.1 and is also present in Section 5.4.2. UFP-QAPP Worksheet 12 Measurement Performance Criteria information has been added as an appendix.

References

Rose, Brien P., Hansen, Gabriel S., Ayers, David E., and Mesa, Matthew G.. 2013. Late summer and fall diet and condition of smallmouth bass, walleye, and channel catfish in the middle Columbia River, USA. Final Report of Research 2012 U.S. Geological Survey, Columbia River Research Laboratory, Cook WA. December 23, 2013.

United States Army Corps of Engineers (USACE) 2020. Final Work Plan with Quality Assurance Project Plan for Smallmouth Bass Acoustic telemetry and Tissue Sampling and Crayfish Tissue Sampling at River Operable Unit, Bradford Island, Cascade Locks, Oregon. August 14, 2020.